Slippery Slope Arguments Imply Opposition to Change

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if $p$, then $q$
A variety of conditionals

If I win the lottery, I’ll buy myself a classic Porsche. *(indicative)*

If I had left the house earlier, I would have avoided the traffic on the motorway. *(counterfactual)*

If I break the speed limit, I’ll get a speeding ticket. *(deontic)*

If we agree to air strikes in Syria, we will be on a slippery slope towards ‘boots on the ground’. *(slippery slope argument)*
It’s a matter of timing...

- Much work in the area of human language processing focuses on *when* different kinds of information influence comprehension, and *how* readers build the mental representations associated with meaning.

- In contrast, much work in the area of conditionals focuses on the *final* mental representations that people construct (rather than on the processes involved in their construction).
Reasoning as we Read

• Comprehension of conditionals is non-trivial. Amongst other things, successful comprehension involves determining whether the conditional is describing a possible future situation, or is a counterfactual requiring ‘undoing’ of the past. It involves determining the degree of belief of the conditional, deciding what speech act is being communicated (was that a promise?), and also the speaker’s persuasiveness when engaged in the use of a slippery slope argument.

• And lots more!
How does ‘believability’ of a conditional affect reading?

- Building on Oberauer & Wilhelm, (2003), and Over et al., (2007), Haigh et al., (2013) examined how different sources of probability affect reading of conditionals such as:

  *If student tuition fees rise, then applications for university places will fall.*
• P(p) and P(q|p) were the strongest predictors of reading times.
• Haigh et al. used self-paced reading - a relatively coarse-grained measure of reading. Words appear one by one so normal reading processes are disrupted.

• Similar problem with examining event-related brain potentials during reading (e.g., Bonnefond & Van der Henst, 2013).

• So, if we want to measure how different sources of information influence the comprehension of conditionals during normal reading, how do we do it?
Slippery Slope Arguments (SSAs)

- If \( p \), then \( q \) SSAs describe an initial proposal (\( p \)) and a predicted, undesirable consequence (\( q \)):

  If we agree to air strikes in Syria, we will be on a slippery slope towards ‘boots on the ground’.

Haigh, Wood, & Stewart (under revision)
Four Components of SSAs (Corner et al., 2011)

If we agree to air strikes in Syria, we will be on a slippery slope towards ‘boots on the ground’.

1. An initial proposal (air strikes in Syria).

2. An undesirable outcome (boots on the ground).

3. The belief that (air strikes in Syria) will lead to a re-evaluation of (boots on the ground) in the future.

4. The rejection of (air strikes in Syria) based on this belief.
If we agree to air strikes in Syria, we will be on a slippery slope towards ‘boots on the ground’.

- Degree of belief in the argument (3) is based on the subjective conditional probability.

- Rhetorical function is for the recipient to reject the initial proposal.

- We are interested in (a) what SSAs are taken to reveal about the producer’s attitudes, and (b) how SSAs are processed during comprehension.
• SSAs can be thought of as a negative consequentialist argument (following Corner et al., 2011, Bonnefon & Hilton, 2004).

• In Study 1 we examined what SSAs are seen to reveal about the attitudes of the producer.

• 24 Ss presented with 24 SSAs and asked to write down what they think the producer believes.
Carly utters: *If voluntary euthanasia is ever legalised, then it will ultimately lead to the legalisation of involuntary euthanasia.*

~ 77% of responses indicated that participants inferred the speaker had a negative attitude towards the antecedent.

- Participant 2: “Carly disagrees with voluntary euthanasia”
- Participant 3: “Carly does not think voluntary euthanasia should be legalised, as it could lead to murder.”
- Participant 16: “Carly thinks the risks associated with the escalation of the laws is not worth legalising voluntary euthanasia.” [sic]
- Participant 19: “Carly opposes voluntary euthanasia.”
• The paraphrases that people produced are consistent with the idea that people who produce SSAs are arguing against the initial proposal (e.g., that voluntary euthanasia should not be legalised.)
Study 2

- For each of the same SSAs examined in Study 1, 45Ss had to provide the following:
  - The prior subjective probability of (p)
  - The prior subjective probability of (q)
  - The subjective conditional probability of q given p.
  - The subjective undesirability of q.
  - The extent to which the argument implies the proposal (p) should be rejected.
• The arguments were perceived to have an undesirable outcome ($M = 81.6$), and strongly implied the argument was against the initial proposal ($M = 77.6$).

• The more undesirable the outcome, the more the argument should be rejected ($r = 0.847$, $p < .001$).

• The conditional probability of (q) given (p) was greater than the prior probability of (q) ($0.25$ vs. $0.18$; $t(44) = 7.7$, $p < .001$). This indicates the SSAs raised the probability of the outcome.
• Study 2 shows that SSAs increase the perceived likelihood of an undesirable event and strongly imply that the speaker wants the initial proposal to be rejected.

• The more undesirable the predicted consequence of the initial proposal, the more the speaker is seen to be arguing for the rejection of this proposal.

• Consistent with the notion that SSAs are a form of negative consequentialist argument.
• So people are sensitive to a variety of factors related to SSAs, but how are SSAs processed online?

• We know from our previous work that conditional probability predicts reading times for standard indicative conditionals. Are SSAs treated the same way?
Study 3 - Eye-tracking

• The purpose of Study 3 is to examine how SSAs are processed online.

• As shown in Studies 1 and 2, the default interpretation of a SSA is that the speaker opposes the initial proposal.

• Prediction that SSAs will only be read without penalty when the speaker’s attitudes permit the interpretation that the speaker opposes the initial proposal.

• Alternatively, if SSAs aren’t special then we might expect reading to be influenced only by P(q|p).
24 participants read 24 SSAs in one of three conditions: Speaker was known to be against the antecedent proposal (Consistent) vs Speaker was known to support the antecedent proposal (Inconsistent) vs Speaker’s position towards the antecedent proposal was unclear (Neutral).

• Prediction 1 - reading time will be best explained by the extent to which the SSA fits with the speaker’s attitudes. So, SSA will take longer to read when the reader knows the speaker actually supports (rather than opposes) the initial proposal.

• Alternatively, Prediction 2 - SSAs aren’t special (at least when read) so P(q|p) will best explain reading times. The higher the P(q|p), the quicker to read (cf. our M&C 2013 paper).
### Introduction
Jayne and Carly were discussing their feelings about euthanasia.

<table>
<thead>
<tr>
<th>a) Consistent context</th>
<th>Carly was strongly against it becoming legal in the UK.</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Inconsistent context</td>
<td>Carly was strongly in favour of it becoming legal in the UK.</td>
</tr>
<tr>
<td>c) Neutral context</td>
<td>Carly had recently heard that it could become legal in the UK.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Antecedent (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>She argued that</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consequent (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>it will ultimately lead to the legalisation of involuntary euthanasia”.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Final sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>They were both engrossed by a live television debate on the subject.</td>
</tr>
</tbody>
</table>

- Key analysis regions were the Antecedent and Consequent.
• Analyses uses linear mixed models with crossed random effects of participants and items:

• Following Prediction 1:
  \[ \text{Reading Time} \sim \text{Context} + (1 + \text{Context} | \text{Subj}) + (1 + \text{Context} | \text{Item}) \]

• Following Prediction 2:
  \[ \text{Reading Time} \sim P(q|p) + (1 + P(q|p) | \text{Subj}) + (1 + P(q|p) | \text{Item}) \]
No effects on first pass reading times
Regression path reading times

* < .05
Consequent ~ Context + (1 + Context|Subj) + (1 + Context|Item)

Parameter estimates in ms. per condition.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Estimate</th>
<th>S.E.</th>
<th>df</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inconsistent (intercept)</td>
<td>2229</td>
<td>184</td>
<td>33.01</td>
<td>12.123</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Consistent</td>
<td>-340</td>
<td>164</td>
<td>24.35</td>
<td>-2.073</td>
<td>&lt; .05</td>
</tr>
<tr>
<td>Neutral</td>
<td>-369</td>
<td>160</td>
<td>24.84</td>
<td>-2.306</td>
<td>&lt; .05</td>
</tr>
</tbody>
</table>
Consequent $\sim P(q|p) + (1 + P(q|p)|Subj) + (1 + P(q|p)|Item)$

<table>
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<th>S.E.</th>
<th>df</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2016</td>
<td>190</td>
<td>24.69</td>
<td>10.636</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>P(q</td>
<td>p)</td>
<td>-0.93</td>
<td>6</td>
<td>12.58</td>
<td>-0.148</td>
</tr>
</tbody>
</table>
Total Time reading times

* = .058
Model 1

Consequent ~ Context + (1 + Context|Subj) + (1 + Context|Item)

Parameter estimates in ms. per condition.

<table>
<thead>
<tr>
<th>Condition</th>
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<th>S.E.</th>
<th>df</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inconsistent (intercept)</td>
<td>2103</td>
<td>155</td>
<td>34.91</td>
<td>13.557</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Consistent</td>
<td>-205</td>
<td>102</td>
<td>21.08</td>
<td>-2.007</td>
<td>&lt; .0577</td>
</tr>
<tr>
<td>Neutral</td>
<td>-185</td>
<td>107</td>
<td>21.62</td>
<td>-1.726</td>
<td>&lt; .099</td>
</tr>
</tbody>
</table>
Model 2

Consequent ~ $P(q|p) + (1 + P(q|p)|Subj) + (1 + P(q|p)|Item)$

<table>
<thead>
<tr>
<th>Condition</th>
<th>Estimate</th>
<th>S.E.</th>
<th>df</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1953</td>
<td>187</td>
<td>17.664</td>
<td>10.440</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>P(q</td>
<td>p)</td>
<td>0.669</td>
<td>6</td>
<td>10.828</td>
<td>0.118</td>
</tr>
</tbody>
</table>
Study 3 Conclusion

• The model based on Context (i.e., where we manipulate what is known about the speaker’s attitudes) predicts reading times (particularly regression path time). The model based on $P(q|p)$ does not predict reading times on any measure.

• Supports the idea that SSAs are interpreted as revealing something about the speaker’s attitudes. They seem to be treated differently from indicative conditionals when these are not used to form SSAs.
• The SSA reading time data are compatible with a view that readers have difficulty understanding a SSA when it goes against what it is known about the producer’s attitudes.

• Readers are rapidly sensitive to the rhetorical function of SSAs and what they reveal about the producer’s attitudes with respect to the antecedent proposition.
Study 4

• Reading time data from Study 3 suggest readers aware of coherence between speaker’s beliefs and what they say.

• Does this influence persuasiveness?

• Are arguments seen as more persuasive when not inconsistent with the speaker’s beliefs?
• 45 Ss were asked to provide agreement ratings for 3 statements about each of the SSAs with context presented in Study 3:

i) The argument is consistent with the speaker’s beliefs.

ii) The speaker opposes [action A].

iii) The speaker makes a persuasive argument.

Statements were each rated on an 11 point Likert scale anchored at -5 (Strongly Disagree), 0 (Neither Agree nor Disagree) and +5 (Strongly Agree).
ANOVA and pairwise comparisons reveal all three conditions differ significantly from each other (and 1-sample t-tests reveal all differ from zero).
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• Study 4 data reveal that people are sensitive to the (in)coherence between the speaker’s beliefs and the argument.

• When the argument is not inconsistent with a speaker’s beliefs, people infer that the speaker is against the initial proposal in the SSA.

• SSAs are seen as less persuasive when the argument is known to contradict the speaker’s beliefs.
What does it all mean?

- Someone who produces a slippery slope argument is seen as being against the initial proposal (Study 1).
- The more undesirable the consequence of the initial proposal, the more the speaker is seen to be arguing for the rejection of this proposal (Study 2).
- Readers are sensitive online to the (in)coherence between the attitudes of the speaker and the argument they produce (Study 3).
- SSAs are seen as less persuasive when the argument is known to contradict the speaker’s beliefs (Study 4).
- Potentially relevant for work in the broader area of experimental pragmatics.
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